Chapter VI
Database Development for Online Courses

INTRODUCTION

In the previous chapter, we discussed the issues related to the server operating system which is used to host other application software such as a learning management system and database management system. The discussion in the previous chapter indicates that, for the learning management system, a database is required for storing course and student information. This chapter will first explore some of the open source database management systems. Several commonly used open source database management systems will be introduced. The features of the database management systems will be compared. We will examine how these features are used to store the course and student information and to support the management of the online teaching/learning system.

The next topic in this chapter is about database design for an online teaching/learning system. Within this topic, we will first review the database development cycle. Then, we will go through some general database procedures which consist of three stages, conceptual design, logical design, and physical design. We will discuss issues such as collecting information about the requirements for the new database, design a data model to meet the requirements, and discuss issues related to physical design.

After the discussion of database design, we will look at the development and implementation of a database for the online teaching/learning system. We will discuss the selection of a database management system (DBMS), converting the data model to a relational database, creating and implementing database objects, and so on.
The next topic is about database management. Once the database is developed, it is required that the database be well maintained for supporting the online teaching/learning system. We will look at the tasks to be performed by the database administrator including user management, database backup and recovery, database performance tuning, and database security related management.

Lastly, this chapter will give an example of installing and configuring MySQL on a server with the Linux operating system. It will examine the system requirements and demonstrate the procedure of downloading and installing MySQL. This example will show how the Linux operating system supports MySQL and the database operation in the Linux environment. The second example in this chapter is about setting up PHP and MySQL development environment.

BACKGROUND

An online teaching/learning system usually supports hundreds of or thousands of courses each semester. These courses generate a large number of data including course materials, student information, assignments and grade-related information. Semester after semester, the data generated by these courses are accumulating. To be able to store and manage the large number of current and historical data, it is required that a reliable database should be developed to meet the requirements of the online teaching/learning system. Many open source database management system packages are available for developing databases that can be used to store and track data for online courses.

The subject related to developing databases for online teaching/learning systems has been widely studied. Ratna, Samuel, and Bayuaji (2002) developed a synchronous Web-based learning system on which Web Chat was used as interactive media. The Web Chat program was supported by the open source database MySQL and the PHP scripts. The system provided Web-based real-time communication between instructors and students. It also provided management tools to control the real-time communication process. In another study, Potter and Hicks (2004) integrated the open source database application into the social studies classes and the classes of other subjects. By using the open source database application, they were able to develop a well-designed database with minimal cost.

Performance tuning is one of the tasks in database management. The experimentation system developed by Pozniak-Koszalka and Helwich (2005) can be used to test the efficiency of a relational database. Their experimentation system is particularly useful for improving the efficiency of Internet applications and open source database management systems such as MySQL.